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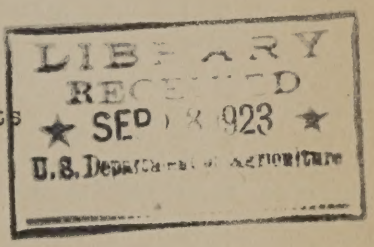
FERTILIZERS FOR CITRUS FRUITS

Excerpts from 1922 Annual Reports
of State and County
Extension Agents.



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FERTILIZERS FOR CITRUS FRUITS*

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California

The amount of commercial fertilizer used in citrus orchards in California greatly exceeds that used on all other agricultural crops combined. No definite information has been secured regarding the amount and combination of material required for this crop for the different soils and climate, and as a result a collossal waste has occurred from applying mixtures which have given no benefits. High land values, a scarcity of manure, and the exacting requirements of citrus trees have developed a great demand for specific information regarding the proper combination and amounts of fertilizer which will meet the needs of the industry. To this end numerous tests have been outlined in the different counties concerned to extend over a sufficient period of time so the data obtained might serve as a reliable guide to farmers. - B. H. Crocheron, County Agent Leader, University of California, Berkeley.

Two tests of sulphur as a fertilizer and soil amendment are being carried on in orange groves on red hardpan land (San Joaquin loam). One plot had sulphur applied at the rate of two pounds per tree in November, 1921, and the other plot at the rate of five pounds per tree in February. In both cases the sulphur was broadcasted under the drip of the tree and cultivated in. Both these plots, together with their check plots were plowed in the spring and cultivated in the usual way. Irrigation water was applied every 3 or 4 weeks with one or two cultivations between irrigations. No noticeable improvement is evident from this treatment in either soil or trees. These tests will be continued.

One test of sulphate of ammonia is being conducted in a ten-year old orange grove on red harpan land (San Joaquin loam). Applications were made at the rate of 1.9 pounds per tree and 3.8 pounds per tree with a check plot untreated. These applications were made in two lots, one-half in May and one-half in June in the furrows before irrigating. The customary method of spring plowing with clean summer cultivation was practiced in this grove. No measurable results have been obtained to date, but records of yields will be kept and the tests continued. - Charles M. Conner, County Agent, Visalia, Tulare County.

Practically all of our citrus soils are deficient in nitrogen and it has been shown that applications of nitrogen do pay and that where these applications are in bulky organic material the soil can be maintained in a satisfactory physical condition. Phosphoric acid and potash have never been shown definitely to be profitable as citrus fertilizers in California, but it may be possible that if sufficient nitrogen is supplied to remove it from the limiting element class that

* No attempt is made to cite all references to fertilizers for citrus fruits in this circular. Only selected extracts showing typical methods employed and results secured in some States are included.

one or both of these other materials may be of value in improving the quality of the fruit, if not in increasing the yield. The same is true with regard to lime, sulphur, gypsum, and other soil amendments.

Accordingly, 106 test plots have been laid out, - 64 in Los Angeles County and the rest in Orange, Ventura and San Bernardino. These plots involve trials of various forms of nitrogen, including almost all inorganic and organic forms available to the growers in this State, and in addition to nitrogen other commercial fertilizers, manures, and leguminous straws. Inasmuch as we do not wish to have any trees deteriorate in the long time plots in Los Angeles and Orange Counties, there will be no unfertilized plot, but all will receive at least 1 pound of nitrogen per tree per year. In addition to the fertilized plots there are test plots on the use of cover crops both summer and winter. This project was just started during the last few months and to date no results are available. It will be carried to other counties and the results will be recorded for a period of 10 years wherever possible. - Specialist in Citriculture, University of California, Berkeley.

Large sums of money have been expended annually since the establishment of the citrus industry in the county for barnyard manures and commercial fertilizers of all kinds. These have been applied in varying amounts and combinations with and without cover crops, on all types of soils. There is little definite information as to kinds of fertilizers and the amounts required to produce best results in terms of quality and quantity of fruit on our different types of soil. It is a known fact that citrus groves receiving no fertilizers of any kind go into decline and become unprofitable in time. There is increasing demand on the part of growers for definite information as to kinds, combinations and amounts of fertilizers which will produce best results under Orange County's different soil conditions.

It has been definitely shown that bulky nitrogenous fertilizers pay, and that their use keeps the soil in satisfactory physical condition. It has also been shown that concentrated nitrogenous fertilizers produce satisfactory yields of fruit but we do not have definite information as to the effect of their long continued use on the physical condition of our different soil types. It has never been shown that either phosphoric acid or potash can be profitably used as citrus fertilizers, but it may be that if applied to set a large crop of fruit, that one or both of these other materials may be of value in improving the quality of fruit, if not in increasing the yield.

There is not enough bulky nitrogenous fertilizer available to supply the needs of Southern California citrus groves, so it is necessary to demonstrate that the fertility can be maintained with some other materials. It is altogether possible that the concentrated materials as mentioned above may prove satisfactory but it is probable that the ideal system will be a combination from these two sources of material. Two series of fertilizer plots were established this year on each of two common types of soil - (1) light, sandy Hanford loam at the Orange County Farm, cooperating with the County Board of Supervisors; (2) clay loam (Yalo) at the C. C. Chapman Ranch, Fullerton, where 30 plots, using six different treatments have been started for a 10 year period. Another plot using iron sulphate to correct a serious case of chlorosis has been established. Four to nine pounds per tree were applied. The test is yet incomplete.- Harold E. Wahlberg, County Agent, Santa Ana, Orange County.

Florida

Fertilization is one of the leading problems of the citrus grower of Florida. Due to the many types of soil that may be found on even a small tract of land, to the various cultural methods employed by individual growers, to the presence or absence of artesian well or other irrigation systems, and also to the fact that there are so many other factors, such as the ever-changing weather conditions, not only during the seasons, but the great variations from year to year, it is very difficult to arrive at any definite conclusion as to just what is the best formula, the best analysis, the most opportune time, and the correct amount of fertilizer to use on a given grove. However, by studying the past history of the grove, and carefully watching the results of a given mixture of fertilizer, one can come to at least a fairly practical basis to work on for future treatment. The county agent is called on in innumerable cases to suggest the kind and amount of fertilizer to use. In fact, some of the growers have now reached the stage where they depend entirely on the advice of the county agent, not only in the application of fertilizers, but in practically all grove operations.

Besides the regular routine of fertilizing, a number of experiments are being carried on with growers where special treatment seems to be necessary. The marly soils, especially, have always been a source of perplexity. Trees grown on this type of soil lack the growth and verdant vigor that they should have, but instead show a weak, straggly, yellow growth. In an effort to overcome this condition a number of tests are being tried out in several groves. These tests may be divided into two classes - cultural and chemical. The cultural tests include, - little or no cultivation, much cultivation, and mulching. In the tests of the second class, a number of different chemicals or materials, singly or in combination, are tried out, among which may be mentioned iron sulphate, magnesium sulphate, magnesium carbonate, kainit, and manure. It has been found over and over again in connection with different kinds of plants that etiolation is due to a lack of either iron or magnesium, in some cases caused by an excess of calcium carbonate of some form in the soil. Also, science in recent years has found that chlorophyl in all green plants, contains the element magnesium as one of its chemical constituents. Iron also is present in chlorophyl, but probably only as a catalyzer. We are looking forward to some very interesting results from these tests. - Alfred Warren, County Agent, Fort Pierce, St. Lucie County.

As there was no fertilizer suitable for citrus manufactured in this part of the State, and high freight rates on the price of fertilizer manufactured in distant parts of the State made the use of it prohibitive, I proceeded to arrange with a certain fertilizer company nearby to obtain the required materials and manufacture a carload of fertilizer as per my formula, six per cent phosphoric acid, four per cent ammonia, five per cent potash and without filler of any kind. When this arrived packed in bags of 145 pounds each, but with plant food equivalent to 200 pounds of the above analysis, I had to explain to the growers why the sacks were not full. This demonstrated to them that they had been paying at the rate of millions of dollars per acre for real estate, or something no better. - R. R. Whittington, County Agent, Panama City, Bay County.

The most important grove work centers around that of increasing crop production. It is here that haste can only be made slowly as keeping groves up to maximum tree capacity calls for the most careful balance and a gradual increase in total fertilizer applied until further tonnage would be unsafe as injury to

the trees and crop would surely result. Such work is absolutely unreliable as showing no definite conclusions until after a series of years have passed during which it has been tried. When it is recalled that citrus will use as high as 125 pounds of fertilizer per tree or even more, the importance of fertilizer effect can be appreciated. Chemicals and organics have different effects, each kind of substance in quantity will have a different effect on tree condition and fruit quality. The question of fertilizers is easily the biggest single problem for Florida and to date we know practically nothing about these effects. - C. D. Kime, County Agent, Orlando, Orange County.

During November and December of 1921 the citrus work consisted in advising and urging a fall or winter application of fertilizer to the citrus trees in order to build up a reserve food supply for the spring growth. In most cases this was advised to be applied not later than November 15. The formula and kind of fertilizer for this application was generally recommended. A clean-up spray for scale and whitefly was advised in all groves where no early fall spray had been applied for these insects. Close watch was kept for the appearance of the rust mite in various groves in different sections and control measures were recommended for the community in which the pest was found. This insect becomes very troublesome in this section during November, December and January, and it is apt to cause serious injury to the appearance of the fruit unless it is soon eradicated from the trees. The rust mites do their damage very quickly, in 10 days or two weeks time when they become numerous, and a close watch must be kept over the groves during this period if bright fruit is to be expected. As soon as the mite appears steps should be taken immediately for its control, as a delay of three weeks or a month may mean that 50 to 75 per cent of the crop will be lowered in grade. Pruning out dead wood during December and January was advised as a means of reducing melanose. H. E. Stevens, County Agents, Ft. Myers, Lee County.

About 50 demonstrations in fertilizing citrus trees, both bearing and non-bearing, were very satisfactory. Many of our growers are coming to look upon the matter of feeding the trees and expect returns in fruit in direct proportion to the amount of fertilizer applied, provided the soil is in normal condition. Not one grower in a thousand who has been reached by our demonstrations doubts that it pays to fertilize an orange grove. The question is not "Shall I fertilize" but "How much can I use" or "What is the economic balance."

The real lesson in our cover crop demonstrations of last year (1921) were not fully brought out till the drought came on last spring. During the drought, one could spot every grove in which a good cover crop had been grown and turned under last year -- The trees in these groves, as a rule, suffered only slightly, while trees in groves growing little or no cover crop lost much of their fruit and foliage. It was very striking-- a subject of much comment among growers. Growers are being impressed with the fact that we must build up and maintain the vegetable matter in our citrus soils in order to get the best results from commercial fertilizers applied. Such matters as this are being stressed in our Citrus Club meetings. More attention is being given to saving barnyard manure, and to its value in the orange grove. We need a thousand tons for every ton we have. - E. F. De Busk, County Agent, Tavares, Lake County.

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